ENTE NAZIONALE PER L'ENERGIA ELETTRICA

PROPOSAL TO THE STATE OF HAWAII DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM FOR TECHNICAL ADVISORY SERVICES RELATING TO GEOTHERMAL RESOURCE ASSESSMENT

Rome, April 1991

INDEX

FOREWORD

WHEREAS:

ENEL is the Italian National Electricity Board responsible for generation, transmission, distribution, import, export and sales of electric power generated from any source throughout Italy.

ENEL, in terms of size, is the third largest electricity utility in the world, while on an Italian domestic economy level ENEL figures alongside the major industrial and commercial groups;

ENEL has a multiyearly experience in all the fields of electric power, which has been made available to other countries for the development of cooperation programs; therefore it is in a condition to supply its consulting services and technical assistance on whatever item related to design, engineering operation and maintenance of power plants and equipment;

ENEL, in particular, as far as geothermal energy is concerned, is in a rather unique position to provide consulting activities abroad. In fact, the first experiments with geothermal energy in Italy date back to 1904 and use on an industrial scale began in 1913. In 1990 electric power generation from geothermal resources in Italy was 3,222 GWh, while during the same period the installed capacity of geothermal power was 560 MW;

ENEL is carrying out its own programs for the development of geothermal resources which will bring the present installed capacity of 545 MW to 832 MW by 1995 and to 1450 MW by the year 2000.

ENEL is at present involved in several research and development programs in collaboration with important organizations such as the United States Department of Energy and the International Atomic Energy Agency of the United Nations and also maintains informal contacts around the world with the most important organizations operating in the field of geothermal energy;

ENEL supplies various electric Power Authorities worldwide with its consulting services and technical assistance for the development of geothermal projects.

WHEREAS:

The Government of Hawaii intends to develop the geothermal resources available in the Big Island and more precisely in the Kilauea East Rift Zone (KERZ).

Following contacts initiated in 1989, the Government of Hawaii decided to avail itself of ENEL as a consultant on some of the activities concerning the development of geothermal resources in the (KERZ) area.

An "Agreement for Advisory Services for the Geothermal/Cable Project" (Contract No. 27272) has been signed between the Department of Business and Economic Development, State of Hawaii (DBED) and Ente Nazionale per l'Energia Elettrica (ENEL), which entered into as of 1st day of December 1989 and lasted up to December 31, 1990.

The State of Hawaii, Department of Business, Economic Development and Tourism (DBED) issued a Request for Proposal for technical advisory services relating to geothermal resource assessment.

NOW AND THEREFORE:

ENEL is hereby proposing that it be retained as a Consultant to the DBED to perform the following activities related to the State of Hawaii's geothermal development program and given in your RFP as "Contract Scope of Work":

- Assist DBED and DLNR with general consulting services on all matters related to the development and utilization of geothermal resources.
- Assist DBED and DLNR in establishing priorities among available resource assessment methods

- Assist DBED and DLNR in planning and managing the SOH program and in evaluating available exploratory drilling methods, with cost effectiveness being a major criterion.
- Assist DBED and DLNR in designing and planning appropriate well tests, surface and aerial surveys, and/or mapping projects. Provide advice on appropriate inastrumentation and equipment, methods and procedures, presonnel, and budgets.
- Assist DBED and DLNR by providing technical guidance relative to the geothermal/cable project master plan and EIS being prepared by the consulting firm ERCE.
- Assist DBED and DLNR by providing technical guidance relative to planning and design of the geothermal/cable project by the consortium and HECO.
- Assist DBED and DLNR to make reasonable judgments and to reach objective, scientifically supported conclusions about the extent and characteristics of geothermal resources, recognizing that such judgments and conclusions may serve as the basis for public policy and/or investment decisions.
- Advise DBED and DLNR on well-field design and management in order to assist them in adopting appropriate policies, standards, and design criteria to avoid over-production and premature depletion of geothermal resources.

ENEL QUALIFICATIONS

1. ENEL PRESENTATION

ENEL, the Italian National Electricity Board is a public statutory body established for unlimited duration by Law No. 1643 of December 6, 1962 of the Republic of Italy. Its function include the acquisition and operation throughout Italy of facilities for generating, transmitting, transforming, distributing, importing, exporting and selling electric power produced from any source; the provision of consulting services to foreign entreprises; the establishment of enterprises abroad dealing with export from and import to Italy of electric power, and the coordination of operational and planning activities in order to ensure adequate availability throughout Italy of electric power at minimum cost, having regard to the overall economic development of the Republic of Italy.

This enormous drive forward over the past 28 years has undoubtedly brought about significant results that can be summed up in the following operating results: since 1984 ENEL has filed a balanced financial statement every year; in 1989 a net profit of 156 billion lire was registered. The number of customers served has increased from 13 to more than 27 million; the quantity of electricity sold has increased from 40 billion kWh to 190 billion Kwh today; the quantity of electricity sold per employee rose from 600,000 to 1,690,000 kWh; the employee/customer ratio increased from 192 to 242; the cost per kWh sold went down in real-term values from 1963 to today by over 40%, despite the fact that fuel costs increased by 57% in the same period.

ENEL ensures the coverage of 84% of Italian electricity generation (the other 16% is produced mainly by self-producers and by 32 Municipal Works that were involved in the Nationalization Act).

In terms of size, ENEL is the third largest electricity utility in the world.
On an Italian domestic economy level ENEL figures alongside the major industrial and commercial groups and takes second place in the listings (with total income reaching 23,613 billion lire in 1989).

The network of ENEL has today the following characteristics:

Generation plants	**Gross capacity**
Hydro-electric	15,643 MW
Thermo-electric	31,871 MW
Nuclear	-
Geothermal	514 MW
	48,028 MW

Transmission lines	**Circuit length**
380 kV	8,232 km
220 kV	11,871 km
150-120-60 kV	9,930 km
	29,425 km

Transformation substations of the transmission network

Network transformer nominal capacity	83,100 MVA

Distribution plants

Number of primary sub-stations (HV/MV)	1,263
Transformation nominal capacity in primary sub-stations	59,696 MVA
High voltage lines (40-150 kV)	26,799 km
Medium voltage lines (6-30 kV)	283,588 km
Number of secondary	

sub-stations (MV/LV)	281,484
Transformation nominal capacity in secondary sub-stations	47,308 MVA

For construction and management of these plants and equipment including user service, ENEL can count on 112,329 employees, of whom over 10,000 are university graduates. With its technical structures ENEL can autonomously provide for design, construction, commissioning and operation of generation plants that exploit any type of source, including the non-traditional type (biomass, solar, wind, etc.), transmission lines, transformation and distribution of equipment.

2. ENEL EXPERIENCE IN THE GEOTHERMAL FIELD

ENEL is in charge of carrying out research, exploitation and generation of geothermal energy in Italy.
ENEL considers geothermal generation in Italy very important. This resource is in fact one of Italy's few national resources, and even though its quantitative contribution is modest, it is not negligible. Furthermore, in this field ENEL holds a deep technical know-how along with an outstanding operating experience.
In fact the utilization of geothermal fluids for thermal and chemical purposes began in Italy about 150 years ago and the production of electricity was experienced, first in the world, in Larderello in 1904.

The utilization of geothermal fluids for the production of electricity on industrial scale began in 1913.
In 1990 the geothermoelectric production was 3,222 GWh, with an installed capacity of 560 MW.

The program now underway, carried out within the framework of projects launched by ENEL for the development of electric power from geothermal resources, will bring the installed capacity to 885 MW by 1995. This will make it possible for generation to reach around 5 TWh/year.

In addition to these projects, in the 1990's ENEL plans to find enough fluid for the installation of 10-11 new 20 MW standard units which would bring the installed capacity to 1450 MW by the year 2000 and the generation to more than 6 TWh/year.

Along with electric generation, ENEL is promoting a series of initiatives in the field of thermal uses of geothermal energy.

ENEL Geothermal Division (VDAG) operates within the ENEL Generation and Transmission Department and is the ENEL unit responsible for geothermal activities. VDAG headquarters are located in Pisa where not only management is handled, but

activities are developed regarding engineering, geomineral development, planning, and coordination of all the geothermal activities that ENEL performs abroad.

The operational aspect concerning drilling and construction of plants, as well as their management, is carried out in well-equipped offices and laboratories at Larderello.

VDAG covers with its own personnel all the activities relating to research, development and utilization of geothermal resources.
The most important activities are listed herebelow:

- geological, geophysical and geochemical surveys and prospecting in Italy and abroad;
- geothermal drilling by means of 13 drilling rigs, 11 of which are capable of reaching depths between 3,000 - 5,000 m and the remaining are used for workover services on wells to be maintained;
- well testing, field evaluation and production engineering;
- specialized laboratory tests on drilling muds, cement slurries and geothermal fluids;
- design of geothermal power plants and associated equipment;
- management of the geothermal fields and power plants;
- maintenance and repairing operations of power plants by means of a specialized workshop;
- consulting services abroad.

To cover the above activities, VDAG counts on a total of around 1,500 people, 90 of which work at Pisa headquarters.

Because of the above described situation, ENEL is in a rather unique position to provide consulting services abroad for all the activities related to geothermal project, starting from the initial reconnaissance phase up to the commercial production of electricity.

2.1 Care of the environment. Social commitments

Ever since the beginning of modern-day exploitation of geothermal zones ENEL has been especially attentive to relations with local agriculture and tourist operators, while never losing sight of environmental protection, not only as concerns dangerous emissions but also with respect for landscape beauty. Along these lines ENEL actions in this field comply with the laws in force on environmental issues and envisage commitments with local administrations.

In fact, some laws do exist in Italy which prescribe the performance of a study for the preliminary evaluation of the environmental modifications involved by the scheduled activities, as well as the measures to take to re-establish the natural environment.
The above mentioned provisions are a first step for the protection of the environment touched upon by the project.

Moreover, a specific article establishes the contributions to be paid by the concessionary to local authorities. These contributions are calculated both in function of the installed capacity and of the generated electric power.
The revenue of these contributions is assigned to environmental protection and also to the socio-economic development of the area.

A further article gives ENEL the possibility to promote the constitution of and participate in consortia or companies for the exploitation of geothermal resources. This provision favours the development of economy and employment in the area and, moreover, local operators may avail themselves of ENEL experience for the best exploitation of the geothermal resource.

ENEL's agreements with regions, municipalities, companies, and consortia are also envisaged for the transfer of the geothermal fluids that it is impossible to use for electric power

generation.

Finally, the law envisages the best urban site location of the plant to be built.

As to ENEL commitments with local administrations, ENEL set up a Committee composed of ENEL technicians and experts appointed by the municipalities for the evaluation of the environmental impact studies, in which the project to be implemented and the possible interactions with the environment are described. Special attention is given to the best location of the plant in the countryside.

As far as social aspects are concerned:

- ENEL set up a Demonstration Center which carries out consulting and promotion activities for the non electrical utilization of geothermal fluids by small and medium users and local authorities. Included in these activities is technical support for obtaining financing for geothermal projects from national and EEC bodies.
  The Center also offers its collaboration for the performance of professional training courses for possible users.
  Worth mentioning, among the non-electrical applications of geothermal power promoted by ENEL and shown in the Demonstration Center, are the "Amiata Project", with its greenhouse heating of 40 hectares, the "Bulera Project" on mushroom growing and fish farming, and the projects for remote urban heating of Ferrara and Vicenza.

- For the implementation of the envisaged projects ENEL commits itself to involving local enterprises as much as possible, in the following ways:
  a) In case of contracts assigned to companies operating at national level, ENEL forces these companies to entrust a part of the subcontracts to local enterprises;
  b) ENEL urges contractors to employ local labour and technicians;

c) ENEL directly commits itself to hiring 70% of plant personnel from the local population.

Therefore, ENEL efforts in protecting the environment and promoting economic and social development contribute to overcome the difficulties that are still met to make geothermal plants accepted by local populations and authorities.

2.2 ENEL experience in geothermal projects abroad

From its foundation ENEL has always taken a favorable view of offering collaboration and technical assistance because it is convinced that geothermal energy can, in certain countries, make a significant contribution to diversifying energy supplies and enhancing the utilization of national sources of energy. On the other hand, it is clear that a willingness to collaborate with other countries, although provoking an outflow of technical and scientific know-how, can also offer the opportunity to follow closely the development of geothermal programs in areas with situations that differed from those in Italy. Given these basic motivations, ENEL's international activity in geothermal sector was organized in the early 1960's along three main lines of action, which are: technical and scientific collaboration, technical assistance and consulting services, flow of information and training of personnel.

ENEL is at present involved in several research and development programs in collaboration with important organizations such as the United States Department of Energy, the Electricity Board and the Institute of Electric Investigations of Mexico and the International Atomic Energy Agency of the United Nations. Apart from these bilateral agreements ENEL also maintains informal links around the world with the principle organizations working in the field of geothermal energy.

Some of the most recent projects, that ENEL has been involved

in as main contractor or with Italian companies, are listed herebelow.

ALGERIA

A geothermal reconnaissance and pre-feasibility study in the Costantinois Oriental region was performed by ENEL on behalf of SONELGAZ in 1980-82.
After the conclusion of this study, SONELGAZ requested an offer from ENEL for a geothermal feasibility study in the Bou-Hadjar area, identified in the pre-feasibility study.

BOLIVIA

In 1985 ENEL signed an agreement with the United Nations Department of Technical Cooperation for Development for the supply of engineering services relating to the geothermal feasibility project of "Laguna Colorada".
The services concerned the completion of surface exploration, drilling supervision, well-site geology, reservoir engineering, techno-economic evaluation of geothermoelectric production, and basic design of a generating plant.
In 1989 the first three exploratory wells were successfully completed and the preparatory activities for the production tests were carried out in 1990.

CHINA

In 1983-85 ENEL (jointly with an Italian Company) carried out a study for the development of the Yanbajain geothermal field (Tibet) and the geological-mathematical modelization study of the Beijing-Tianjin reservoir according to three contracts with the United Nations Department of Technical Cooperation for Development, signed on July 15, 1983.

COLOMBIA

A geothermal reconnaissance study of "Macizo Volcanico" in the Ruiz region was completed in 1980-81.
The study was financed by the Italian Government (Directorate General for Development Cooperation of the Ministry of Foreign Affairs) and identified a few important geothermal areas that are now ready for the feasibility study.

COSTA RICA

In 1983 ENEL signed an agreement with the United Nations Department of Technical Cooperation for Development for the performance of a pre-feasibility study of one or two selected areas and a technical mission of an ENEL geothermal expert to Costa Rica to collect elements for the planning of a general geothermal reconnaissance study of the country.
In 1988 a geothermal reconnaissance study on 70% of Costa Rica was performed and the Tenorio area was chosen. The geological and geochemical activities in this area began in November 1988 and the geophysical prospections in January 1989.

DJIBOUTI

At the request of the Italian Government, ENEL is involved in the development of the Asal Geothermal project jointly financed by the Italian government and the World Bank.

ETHIOPIA

The Italian Ministry of Foreign Affairs - Directorate General for Development Cooperation granted a financing to the Ethiopian Government for the geothermal development of the

Langano area.
To this effect the Italian Government requested ENEL to submit a proposal for the supply of a 4 MW rehabilitated geothermal unit to be installed in Langano. This unit makes it possible to produce electric power and assesses the potentialities of the field.

GREECE

ENEL carried out a geothermal reconnaissance study of a part of the country and a geothermal feasibility study of the Island of Milos on behalf of the Greek electricity utility PPC (Public Power Corporation). As a result of these studies four productive wells were drilled and two existing wells were worked over.

COOPERATION WITH IAEA (INTERNATIONAL ATOMIC ENERGY AGENCY)

ENEL signed an agreement with the International Atomic Energy Agency for research on geochemical and isotopic methodologies in Latin-American geothermal areas.
ENEL collaborated in the research activities envisaged by IAEA in Bolivia, Colombia, Ecuador and Peru by means of study missions and training activities on site, and geochemical analyses in ENEL's laboratory in Italy.

MEXICO

Cooperation activities were carried out with CFE (Comision Federal de Electricidad) and IIE (Instituto de Investigaciones Eléctricas) in the field of drilling fluids and cements. In addition to this activity ENEL performed the training of Mexican experts in geothermal power plant design.

NICARAGUA

At the request of the Italian Ministry of Foreign Affairs, ENEL participated in a mission to Nicaragua, where the aspects concerning the Momotombo field (drilling and cooling tower) and the El Hoyo-Monte Galan field were examined.

OLADE

ENEL took active part in the evaluation of the Colombia-Ecuador Geothermal Project held in January 1988.

PHILIPPINES

On the basis of a contract signed by ENEL with the Philippines Electric Power authority (NPC) in 1988, ENEL supplied technical assistance to NPC for the examination of the offers relating to a geothermoelectric plant in Bacon Manito (2x55 MW) and for the drafting of technical specifications and tender documents concerning the supply of 20 MW geothermoelectric modular units.

TURKEY

An important cooperation program was developed within the framework of the agreement between ENEL and TEK (the Turkish National Authority), financed by the Italian Ministry of Foreign Affairs. It envisaged production tests, inhibitory incrustation tests and interference tests on the wells which feed the Kizildere geothermoelectric plant.

At the same time integrative geological, geochemical and geophysical (electric, magneto-telluric and seismic) prospections were carried out.

TECHNICAL SECTION

1. INTRODUCTION

The activity performed by ENEL pursuant to its contract with DBED has involved the evaluation of studies and geothermal activities carried out in the KERZ area. ENEL has provided DBED with a series of recommendations concerning activities to be carried out as part of the verification and characterization of the geothermal resources before starting the development project. Verifying the geothermal resources is critical because the estimates of the field potential carried out to date for the KERZ area are based on a series of assumptions most of which must still be proven. Even if in this area high temperatures can be reasonably assumed, there is a lack of information about the permeability distribution and the chemical-physical characteristics of the fluids inside the reservoir. It is therefore necessary to plan and carry out a comprehensive program of activities aimed at assessing the existence of an economically and industrially exploitable geothermal resource.

The data supplied by the Scientific Observation Holes (SOH) program and by the full size wells to be drilled in the selected area (Geothermal Resource Subzones) of the KERZ area are particularly important for the commercial development of the geothermal resources.

The execution of an adequate program of well measurements and tests is therefore very important.

The analysis and processing of the data collected both with the SOH and with the full size wells will allow an updating of the geothermal characterization of the area selected for the project and, as a consequence, an updating of the activities related to the resource verification and characterization program.

2. CONTRACT SCOPE OF WORK

ENEL services, detailed hereinafter, shall cover the "Contract Scope of Work" of the Request for Proposal, .

2.1 Geothermal resource assessment

ENEL will assist DBED and DLNR in establishing priorities among available resource assessment methods.
ENEL will assist DBED and DLNR to make reasonable judgments and to reach objective, scientifically supported conclusions about the extent and characteristics of geothermal resources, recognizing that such judgments and conclusions may serve as the basis for public policy and/or investment decisions.
Moreover, ENEL will advise DBED and DLNR on well-field design and management in order to assist them in adopting appropriate policies, standards, and design criteria to avoid over-production and premature depletion of geothermal resources.

2.2 Scientific Observation Holes

The drilling of SOHs was planned in the KERZ area with the aim of collecting information about the drilling characteristics of the formation, the stratigraphy, the temperature trend with depth and the presence of a deep geothermal reservoir.
ENEL is proposing the following services to support this activity:

- assist DBED and DLNR in planning and managing the SOH program;
- assist in evaluating available exploratory drilling methods, with cost effectiveness being a major criterion;
- assist in planning a program of measurements, geophysical logs and tests for each SOH;

3. ADDITIONAL SCOPE OF WORK

ENEL, besides the activities envisaged in the "Contract Scope of Work" of the RFP, described in Chapter 2 of the "Technical Section", is also available to supply general consulting services which may cover technical and management aspects related to surface exploration, drilling, reservoir engineering, surface equipment and power plant construction, field and power plant management.

Moreover, ENEL, on the basis of the experience acquired during the execution of the previous contract, deems it necessary, for the best management of the geothermal project, to integrate the activities envisaged in the RFP, described in Chapter 2 of the Technical Section, with an Additional Scope of Work, detailed herebelow. This will, of course, be done compatibly with the funds the State of Hawaii has available for the extension of the project.

3.1 Full size wells

At present two private operators are drilling full size wells in areas located within the Geothermal Resource Subzones. State coordination of the activities of the two operators is very important to collect significative data and information from the wells.

In support for this coordination ENEL is prepared to supply the following services:

- assistance in planning a program of measurements, geophysical logs, injection and production tests for each well;
- assistance in elaborating and interpreting the collected data, when they become available.

3.2 Field exploitation with the ORMAT units

The installation of the first ORMAT units and the start up of the geothermoelectric production is expected for 1991.

A systematic measurement and test program during the first period of the field exploitation is fundamental for the collection of data and information useful for the fluid characterization and the field potential evaluation.

Should DBED or any other State agency reach an agreement with ORMAT to make field exploitation data available to the State, ENEL proposes the following activities:

- assistance in planning a measurement and test program aimed at the chemical-physical characterization of the produced fluids and at the field potential evaluation;
- assistance in processing and interpreting the collected data, when they become available.

3.3 Assistance for the establishment of a "Geothermal Organization"

The presence of an organization charged with the planning and coordination of all the geothermal activities in the KERZ area has been strongly recommended by ENEL.

Should the State of Hawaii establish such an organization, ENEL will be prepared to supply consulting services to the State of Hawaii for organizing activities, setting up goals, assessing human resources and formulating programs and procedures for said organization.

4. ENEL PERSONNEL REQUIREMENT

ENEL will use a Project Team to carry out the above mentioned activities. This team is formed by a Project Manager, a Geothermal Advisor, and one or more experts for each of the following fields: geology/volcanology, geophysics, geochemistry, hydrogeology, drilling, reservoir, and production engineering.
In addition to the experts of the various sectors, assistant technicians will take part in the work.

5. WORK EFFORTS AND PRODUCTS

Provided that, as envisaged in the RFP, the consulting activities start on July 1, 1991 and last one year, the work of the Project Team will include the preparation of reports as follows:

- Preparation, as needed, of written reports addressing specific aspects of or problems concerning resource assessment work in progress and making specific recommendations.
- Submission on, or before December 1, 1991 of an interim draft written report on geothermal resource assessment, consisting of the following information: (1) a status report on the State's geothermal resource assessment program; (2) a description and brief analysis of available data and information from all public and accessible private sources; and (3) a summary of reasonable judgments and objective conclusions on the basis of the available data and information about the extent and nature of geothermal resources.
- Submission, at least 45 days prior to the end of the one-year contract term, of a draft annual report on geothermal information: (1) a status report on the State's geothermal resource assessment program; (2) a comprehensive analysis of available data and information from all public and accessible private sources; (3) a summary of reasonable judgments and objective conclusions about the extent and nature of geothermal resources; (4) a discussion of the accomplishments in assisting the program during the contract term; and (5) recommendations with regard to future needs, priorities, and plans.
- Submission, at least 5 days prior to the end of the one-year contract term, of a final resource assessment report, incorporating any changes suggested or required by DBED.

In addition to the aforementioned services, ENEL will attend upon request at key meetings of State interagency technical and policy committees involving DBED, DLNR, other State agency officials, and, on appropriate occasions, representatives of involved institutions such as the University of Hawaii and USGS.

With reference to key meetings relating to the project policy, ENEL guarantees that, when summoned, distance will not compromise a rapid participation. Taking into account the travel time, ENEL shall intervene with the same rapidity used by the other official representatives.

As regards technical meetings, ENEL shall make its best efforts to respond immediately.

GENERAL AND ECONOMIC CONDITIONS

1. GENERAL CONDITIONS

1.1 Contract Term

Consulting services will commence on or about July 1, 1991, subject to final execution of an agreement. Duration of the contract will be one year. The contract may be extended for a second year, but any such extension is subject to the availability of funds and to determination by DBED of consultant's satisfactory performance.

1.2 Coordination

The services performed under the Contract shall be coordinated with a designated representative of DBED who will act as the principal liaison between ENEL and DBED to assist in resolving policy questions and to expedite decisions and the review of the work performed.

ENEL, in turn, shall designate, with the approval of DBED, an experienced and qualified professional to do the type of work involved, who shall devote himself primarily to the project. It shall be the responsibility of ENEL to maintain close and frequent communication with DBED's representative at all stages of its work. ENEL shall inform DBED's representative of all contacts made by ENEL with private and public agencies or individuals on matters relating to work performed under the Contract.

1.3 Responsibility for Accuracy, Completeness, and Adecuacy

ENEL covenants and agrees that it shall be responsible and accountable for the accuracy, completeness, clarity, and adecuacy of the work performed.

ENEL agrees to perform the work in a professional manner with a professional attitude that shall involve a personal desire to place

DBED's interest above other considerations and to accept the professional responsibility for the services to be rendered.

1.4 Review of work

All work and reports of ENEL shall be subject to the approval of DBED's designated representative.

1.5 Independent Contractor

In the performance of the services required under the Contract, ENEL shall be considered an independent contractor with the authority to control and direct the performance and details of the work and services required under the Contract; however, DBED shall have a general right to inspect work in progress to determine whether, in DBED's opinion, the work is being performed by ENEL in accordance with the provisions of the Contract. All persons hired or used by ENEL shall be considered ENEL agents and employees and ENEL shall be responsible for the accuracy, completeness, and adecuacy of any and all work and services performed by its agents and employees.

Further, ENEL intentionally, voluntarily, and knowingly assumes the sole and entire liability for any of its agents and employees, and to third persons for all loss, cost, damage, or injury caused, either directly or indirectly, by ENEL agents and employees in the course of thier employment. Any work under the Contract shall not be construed as employment with the State of Hawaii and shall not entitle ENEL or ENEL agents and employees to vacation, sick leave, retirement, or other benefits afforded State employees. ENEL shall obtain its own general excise tax and other business licences and shall be responsible for payment of income, social security, and any other federal, state and local taxes.

1.6 Subcontracts and Assignments

ENEL shall not subcontract or assign, in whole or in part, any of the services to be performed under the Contract without prior written consent and approval by DBED, and ENEL shall not transfer, in whole or in part, any right or title to, or interest in, any of the services to be performed under the Contract without prior written consent and approval by DBED.

1.7 Indemnification

ENEL shall defend, indemnify, and save harmless DBED, its officers, agents, and employees of the State of Hawaii from and agaist any and all manner of actions and claims arising out of or resulting from the errors, omissions, or acts of ENEL, its officers, its employees, or its agents occurring during or in connection with the performance of ENEL services under the Contract. ENEL shall not indemnify or save harmless DBED, its officers, agents and employees of the State of Hawaii occurring during or in connection with the performance of the Contract.

1.8 Confidentiality of Material

Any information, data, report, record, or map, given to or prepared or assembled by ENEL under the Contract shall not be made available to any individual or organization by ENEL without the prior written approval by DBED.

1.9 Copyright

Any summary, report, map, chart, graph, table, publication, or other document produced in whole or in part under the Contract shall not be the subject of an application for copyright by or on behalf of ENEL without prior written consent of DBED.

1.10 Inspections

ENEL shall permit an authorized representative of DBED, at all reasonable times, to inspect and make copies of all summaries, maps, charts, graphs, tables, recommendations, publication material, and other documents produced in whole or in part under the Contract. Such material shall be delivered and surrendered to DBED on demand and shall become the property of DBED.

1.11 Conflict of Interest

ENEL, being the Italian National Electricity Board, represents that it presently has no interest and promises that it shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of the services under the Contract.

Moreover, ENEL declares it has no work in progress or recently completed or any contracts entered into with any private firms involved in geothermal exploration or development in Hawaii.

1.12 Waiver

It is expressly understood and agreed that any waiver granted by DBED as a result of any breach of any covenant, term, or condition of the Contract shall not constitute or be construed in any manner as a waiver of such covenant, term, or condition, or of any other covenant, term, condition, or right to enforce the Contract as provided by law.

1.13 Modification of Contract

Any modification, alteration, or change to the Contract, including modification of the services to be performed, extension of the

time of perfomance, or increases (subject to the availability of funds) or decreases in the amount of compensation, shall be made only by written supplemental contracts executed by the parties.

1.14 Dispute

Any dispute concerning a matter of fact arising under the Contract, which is not disposed of by contract within thirty (30) calendar days may be decided, subject to the consent of both parties, by short-form commercial arbitration in accordance with the rules of the American Arbitration Association, which decision shall be final and binding. The existence of such a dispute shall not relieve ENEL of its obligation otherwise to proceed diligently with the performace of services under the Contract in accordance with DBED's request. Neither shall the existence of such dispute prevent either party to the Contract from bringing an action otherwise maintainable under the law to collect amounts owing or to enforce performance under the Contract; but, the final determination of such action shall be stayed, but only to the extent that its outcome may be affected by the resolution of any dispute under the Contract that has been submitted to arbitration. Nothing herein shall be construed as a waiver of any of the privileges or immunities accruing to DBED as an agency of the sovereign State of Hawaii nor as a consent of DBED to an award to menetary damages by arbitration or otherwise.

1.15 Termination of Contract for Cause

If, for any cause, ENEL fails to satisfactorily fulfil in a timely and/or proper manner its obligations under the Contract, or if ENEL breaches any of the covenants, agreements, or stipulations of the Contract, DBED shall thereupon have the right to terminate the Contract by giving written notice to ENEL of such termination fourteen (14) calendar days prior to the effective date of such termination. In that event, all finished or unfinished

documents, data, lists, reports, cards, or other written material prepared by ENEL shall, at the option of DBED, become BDED's property, and all books, papers, or other documents furnished to ENEL by DBED shall be returned on or before the date of termination and ENEL shall be entitled to receive only such compensation as shall have been satisfactorily earned prior to the date of termination. Notwithstanding the above, ENEL shall not be relieved of any liability to DBED for any damages sustained by DBED as a result of any breach by ENEL. DBED may withhold any amounts due and owing to ENEL until such time as the exact amount of damages due DBED from ENEL is determined; further, DBED may set-off any damages determined against the amounts retained.

1.16 Termination for Convenience

Either party to the Contract may terminate the Contract at any time by giving written notice to the other of such termination and specifying the effective date thereof at least thrity (30) calendar days prior to the date of such termination. In that event, all finished or unfinished documents and other materials as more fully described in Paragraph 1.13 above, shall, at the option of DBED, become DBED's property, and all documents and other materials furnished to ENEL by DBED shall be returned on or before the date of termination. ENEL shall be entitled to receive only such compensation as shall have been earned prior to the date of termination.

1.17 Applicable Law

It is expressly understood and agreed that the validity, construction and effect of the Contract shall be governed by the laws of the State of Hawaii.

2. ECONOMIC CONDITIONS

2.1 Prices

2.1.1 Contract Scope of Work

ENEL will be paid an amount of:
$ 120,000 (one hundred twenty thousand dollars)
for the supply of the consulting services described in Chapter 2 of the Technical Section of the present contract.

This amount has to be considered as a maximum ceiling; should it not be possible to carry out all the activities envisaged in Chapter 2 of the Technical Section, due to reasons not imputable to ENEL, the activities performed will be evaluated on the basis of the costs shown in para. 2.1.2. In any case, the first two key missions will be free of charge.

2.1.2 Additional Scope of Work

If DBED decides to request ENEL to perform the Additional Scope of Work described in Chapter 3 of the Technical Section, the price of the following ENEL services shall be calculated on the basis of the following items:

a) Personnel fees	
Project Manager	590 $/day
Senior Expert	410 $/day
b) Living expenses	150 $/day
c) Round trip air tickets (from residence in Italy to place of work in Hawaii, for ENEL personnel)	4,000 $

2.2 Payment

Payment for work will be made as it is completed upon DBED's receipt of consultant's invoice, with supporting evidence, submitted at the end of each month. Ten percent (10%) of the contract amount may be retained by DBED until final completion and acceptance of all services to be performed under the contract.

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This proposal is valid for a period of 60 days, starting from April 26, 1991.